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January, 1935.

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Potato Improvement and New Varieties for Alberta

BY

O. S. AAMODT
Department of Field Crops



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Potato Improvement and New Varieties for Alberta

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O. S. AAMODT

* Better quality in potatoes begins with choice of suitable variety, good seed and good soil. Better seed of suitable varieties is one of the principal, and perhaps the most fundamental, means to obtain both desirable quality and yield. The problem of cutting the cost of production resolves itself into increasing the yield per acre with a minimum of expenditure for labor and capital consistent with good farming practice. Good seed is the most important factor of all, for no one can get a maximum yield of marketable tubers with poor seed.

It is generally conceded that the potato can be improved in two ways. First, by *breeding*, and second, by *selection*. Improvement by selection can be practised by many because it involves less time and expense than breeding by seed, and offers greater promise of immediate results. The amount of improvement that can be expected by tuber selection is, however, very limited. Success is dependent upon the presence, in the stock being selected, of natural variants brought about by mechanical mixing or mutation. Selection is not an accumulative process, but one of isolation. It will separate varieties into their component strains unchanged.

Mutation as a source of new potato varieties has been recognized for some time. Most varieties produced in this manner are of little commercial importance. Many potato specialists are practically agreed that up to the present time mutation has not proved to be a source of very worthy varieties. Experimental evidence on tuber selection would not justify the plant breeder or grower in its use as a means of improving good stock of varieties now in existence. *Selection* has been retained as a method of obtaining varietal purity and as an *aid in the control of disease*. Where a tuber, or hill selection method is being practised otherwise, one should be on the alert for desirable mutations. A search for mutations can hardly be recommended as a program in itself for the improvement of a strain of potatoes.

Improvement by breeding can only be practised by the specialist, because it involves an immense amount of time, patience and training.

It involves considerable financial expenditure in the artificial crossing of the flowers, the raising of seedlings, and the subsequent testing of those strains that seem to be promising. It will take at least three to five years to determine properly the real value of the new varieties.

Most of our present commercial varieties were produced by the breeding method and introduced to the growers between 1850 and 1890. The method employed was the growing of open pollinated and crossed seedlings followed by selection of the most promising ones (see Figures 1 and 2).



Figure 1.—Showing the development of fruits (true seed) on the Katahdin potato at the University of Alberta, Edmonton, in August, 1933. Seeds produced in this way are used for the production of new varieties.

Very little additional progress was made in the production of new varieties until recently when breeders began again to use the breeding method. In this later work special attention has been given to the production of varieties resistant to disease. Certain diseases can be controlled to some extent by spraying, and by seed and soil treatment. The virus diseases, however, cannot be controlled by these methods. The most effective methods for the control of these diseases have been those based on plant and tuber selection.

In many crop plants the use of resistant varieties is the most effective and economical method of disease control. The development of varieties resistant to disease is being emphasized to a greater degree than ever before by those engaged in potato breeding work. The use of immune, resistant or tolerant varieties of potatoes has recently been introduced in commercial practice.



Figure 2.—Showing the spindly growth of potato seedling (right) and that from the tuber (left). Resting on the two pots is a piece of blotting paper bearing a sample of true potato seed collected from the fruits on Katahdin shown in Figure 1.

Several new varieties have been developed with characteristics that should appeal to the practical grower whether the tubers are for home use or for the market. Some of these new varieties such as Katahdin, Warba, Columbia Russet, Chippewa and Golden have been introduced into Alberta by the University. During the last few years preliminary tests have been made using standard varieties for comparison. The results obtained are summarized in the following table:

POTATO VARIETAL TRIALS AT THE UNIVERSITY OF ALBERTA.
EDMONTON, IN 1933 AND 1934*

Variety	Maturity	Estimated drought injury, 1933	Per cent. of tubers									
			Yield per acre			Marketable			Scabby			Scurfy, 1933 Rhizoctonia, 1934
			1933	1934	Av.	1933	1934	Av.	1933	1934	1933	
Katahdin	very late	none	bus. 303	bus. 332	bus. 318	82	86	84	5	1	0	1.6
Warba	very early	medium	293	298	296	43	70	57	60	tr.	0	1
Columbia Russet	late	slight	397	497	447	69	90	80	3	1	0	tr.
Chippewa	late		328				85			1		1
Golden	late		338				78					0
Snowflake	very early	severe	233	323	278	45	72	59	5	tr.	0	2
Early Ohio	early	slight	291	324	308	76	79	78		tr.	5	0
Bliss Triumph	early	severe	291	326	309	56	71	64	50	2	0	5
Irish Cobbler	early	severe	251	338	295	67	78	73	30	1	0	0
Netted Gem	late	medium	390	334	362	57	93	75	0	0	0	0

*The writer is indebted to W. Jullyan for assistance in the field work.

The Warba tubers were received from Dr. F. Krantz of the University of Minnesota; the Katahdin, Golden and Chippewa varieties from Dr. F. J. Stevenson of the United States Department of Agriculture, and Columbia Russet from Mr. J. W. Marritt of the Dominion Division of Botany and Plant Pathology at the University of Alberta, Edmonton.

The *Katahdin* variety is a selection from a cross made by potato breeders of the United States Department of Agriculture at the Maine Experiment Station. It is resistant to mild mosaic, but not to spindle tuber or leaf roll. The white tubers are of excellent shape, short elliptical to roundish, and with few, very shallow eyes and of desirable cooking quality. It has a high yield and a small percentage of culls. The vines of this variety do not mature early, but the tubers set early. At Edmonton in 1933 there was a severe drought during the month of August. The vines of most of the varieties in the test were completely wilted and dried up before normally mature, while the *Katahdin* variety did not wilt and continued normal growth until the end of the season. *Katahdin* is also highly frost resistant. This is of considerable advantage as far as early frosts are concerned, but may be a disadvantage in some years where the tubers are dug with a machine.

Warba is a new early potato originating at the Minnesota Experiment Station. This variety was developed especially for northern regions and the early market. At some places it is reported as being 7-10 days earlier than Early Ohio and Bliss Triumph. At Edmonton it appears to be only a few days earlier than these two varieties.

Warba is resistant to several types of mosaic, but not to spindle tuber. The tubers are round and blocky, somewhat like those of Irish Cobbler in shape. The skin is white with deep set, pink eyes.

Columbia Russet is a new variety originating in British Columbia as a seedling selection from the Wee MacGregor variety. The tuber is oblong to broad and somewhat flattened, being intermediate between that of Wee MacGregor and Green Mountain in type. The skin is russeted, with a shallow netting and light brown in color. The eyes are medium in number and shallow.

On the University plots at Edmonton it has been the highest yielding variety for the last two years. It was practically free from scab and had an unusually high percentage of marketable tubers. A few growers reported a larger amount of scab than was noted at Edmonton. The tubers have a very nice appearance and excellent cooking quality.

The frost resistance of *Columbia Russet* was equal to that of *Katahdin*, *Golden* and *Chippewa*. The severe frost of August 24th, 1934, did not kill the stems or lower leaves of the above four varieties. The last three mentioned varieties produced new shoots that reached a height of 4-6 inches before being killed by the next frost. These new shoots did not appear on *Columbia Russet*, and as a result the plants seemed to go through a more normal maturation process.

In British Columbia the variety is reported as being higher in yield than *Netted Gem*, especially under dry conditions, and also as being superior in its ability to maintain smoothness under dry conditions. At Edmonton in 1933 it was only slightly more susceptible to drought injury than *Katahdin*.

The *Chippewa* potato is another variety produced from the same cross as *Katahdin* by the United States Department of Agriculture at the Maine Experiment Station. It resembles *Katahdin* in many of its plant and tuber characteristics as well as in resistance to mild mosaic and frost. The tubers are smooth, white, regular in outline, slightly longer in relation to width than *Katahdin* and have very shallow eyes. It is reported as being higher in yield than *Katahdin* in Maine. At Edmonton it has been in the varietal tests for only one year, but here too it produced 24 bushels more per acre than the nearest *Katahdin* check. In the more northerly regions of the United States, especially Michigan and Minnesota, this variety has been received with greater interest than *Katahdin* primarily because of its earlier maturity and higher yield in that country.

The *Golden* potato also originated in Maine as a hybrid selection made by plant breeders of the United States Department of Agriculture. It is not as resistant to disease as *Katahdin* and *Chippewa*. The tubers are medium in size, dark cream to buff in color, smooth, with medium shallow eyes. They have a yellow flesh containing vitamin A and a high cooking quality.

The variety has been grown for only one year at Edmonton. In these limited experiments it was found to be late in maturity, but resistant to

frost. Following a wind and hail storm in the summer, Golden showed rather severe injury. Numerous stems and leaves were broken off, while other varieties were only slightly injured.

In Germany the people are interested in yellow fleshed potatoes to the extent of paying a premium over that paid for the white fleshed potatoes. How much potato breeders are concerned in Germany in the production of new varieties is apparent from the fact that they now have sixty-eight recognized yellow fleshed varieties.

While the growing of potatoes does not constitute an important commercial industry in Alberta, it is an important crop in keeping the table well supplied with food. In recent years it has undoubtedly formed too great a part in the diet of some people owing to their inability to supply



A



B

Figure 3.—The upper picture (A) shows Katahdin (left) and in the background not wilted, and Snowflake (right) badly wilted by the drought at Edmonton in August, 1933. The lower picture (B) shows Snowflake badly wilted (left), Columbia Russet (right) and Katahdin in the background not wilted.

the table with a variety of foods better balanced in nutritive values. It is for this reason that special attention was given to the yellow fleshed variety Golden which contains vitamin A in sufficient quantities to be of nutritional value in the daily diet.

In the dry areas of Alberta the garden potato crop, like the more important field crops, is often a failure. When the latter do fail the garden becomes all the more important as a source of food to maintain the family until better times. In August, 1933, there was a serious lack of precipitation in Edmonton. Potatoes were severely affected by the drought. Certain varieties appeared to be unaffected, others wilted and some were killed (see Figure 3). No definite data are available on their performance on the more open prairie, but the results at Edmonton are highly indicative. The relatively drought resistant varieties Katahdin and Columbia Russet should have a real place on Alberta farms.

In the more northerly areas where early frosts become a limiting factor (see Figure 4), either very early varieties such as Warba, or frost resistant varieties such as Katahdin, Columbia Russet and Chippewa should have a place. Where potatoes are grown for home use, the varieties with frost resistant, late maturing vines should not be seriously objected to as long as the tubers are well formed and mature. In all of our tests to date the tubers of the above varieties have been well matured at Edmonton and proved to be good in cooking quality.

A surplus of tubers on the farm should not be a disadvantage since they are an excellent stock feed. A recent report in the Journal of the Ministry of Agriculture for Great Britain points out the value of potatoes in pig feeding. In the experimental work it was found that four pounds of potatoes were equivalent to one of barley meal.



Figure 4—Showing the comparative frost resistance of Warba (left), badly killed, and Katahdin (right), only partially killed after a seven degree frost at Edmonton on August 24, 1934.

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